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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,475	10/28/2003	Ying Chen	ARC920030067US1	5009
7590 Frederick W. Gibb, III McGinn & Gibb, PLLC Suite 304 2568-A Riva Road Annapolis, MD 21401			EXAMINER AHMED, ENAM	
			ART UNIT	PAPER NUMBER
			2109	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/12/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/695,475

Applicant(s)

CHEN ET AL.

Examiner

Enam Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/28/03.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

Non Final Rejection

This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

Specification

The disclosure is objected to because of the following informalities:

It is mentioned in page 2 lines 12-13 – Also, an exact copy of the user data could be made and stored on n additional disks. This is known as mirroring or “RAID-0” [1]. This is not proper and is believed to be an error because mirroring does not equal RAID-0.(Please refer to the Paterson article – A case for redundant arrays of inexpensive disks (RAID).

It is mentioned in page 13 line 2 –(0.25). There is no unit associated with this number and should be clarified.

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The application, as filed, includes two sheets bearing page number 6. These two sheets are similar, but not identical. In order to remove any ambiguity a substitute specification with properly numbered pages is required.

Appropriate correction is required.

35 U.S.C. 112 Rejection

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-27 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

With respect to claim 1, the claim recites "combining an address of said data block to a set of retrievable addresses". It is not clear from the specification as to how the addresses are being combined. It is ambiguous if the term "combining" is meant to imply comparing addresses or combining addresses. Appropriate clarification is needed as to how the addresses are being combined in a RAID array system. The claim further recites "periodically computing a function of said data stored in said disk array". It is

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ambiguous as to how the data is being manipulated before being stored. The data has not been stored yet from line 1 – “to be stored” so it is unclear as to how the function is being periodically stored. The claim further recites “storing the computed function on at least one spare disk”, however it is not clear from the specification as to what is being stored. It is unclear whether it is the results of the computation or merely the function for the computation being stored. The claim further recites “on a disk failure in said disk array, updating the computed function using said set of retrievable addresses to recompute only altered portions of said function”. It is not clear whether it is the recomputing being done on the ECC function or if the function is applied to the data itself. The claim further recites “deleting said set of retrievable addresses”. The specification does not cover the details of deleting these addresses and why it is being deleted. Hence the specification does not explain the concept in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, how to make and use the invention.

With respect to claim 11, the claim recites “determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored”. It is unclear as to what is meant by “altered since an immediate previous time said redundant data was stored”. The claim further recites “recomputing altered portions of said redundant data; and storing the recomputed altered portions in said data blocks”. The specification fails to introduce this concept and explain in detail. Hence the specification does not explain the concept in such a way as

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to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, how to make and use the invention.

With respect to claim 19, the claim recites "a directory operable for determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored". It is unclear as to what is meant by "altered since an immediate previous time said redundant data was stored". Hence the specification does not explain the concept in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, how to make and use the invention.

With respect to claim 27, the claim recites "means for determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored". It is unclear as to what is meant by "altered since an immediate previous time said redundant data was stored". Another ambiguity is whether either all of the redundant data is being altered or none of the redundant data being altered or some set in between. The claim further recites "means for storing the recomputed altered portions in said data blocks". There is no reference made in the specification as to means for storing recomputed altered portions in said data blocks. Hence the specification does not explain the concept in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, how to make and use the invention.

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-27 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 1, it is not clear from the specification as to certain terms and phrases in the claim which are not explained in the specification. The claim recites "combining an address of said data block to a set of retrievable addresses". It is ambiguous if the term "combining" is meant to imply comparing addresses or combining addresses. Appropriate clarification is needed as to how the addresses are being combined in a RAID array system. The claim further recites "periodically computing a function of said data stored in said disk array". It is ambiguous as to whether the data or the function that operates on the data is being manipulated before storage. The data has not been stored yet from line 1 – "to be stored" so it is ambiguous as to how the function can be periodically computed. The claim further recites "storing the computed function on at least one spare disk", however clarification is needed as to whether the results of the computation or merely the function that was used is being stored. The claim further recites "on a disk failure in said disk array, updating the computed function using said set of retrievable addresses to recompute only altered portions of said function". It is not clear whether the recomputing is being done on the ECC function itself or just on the data. The claim further recites "deleting said set of retrievable

addresses". The specification does not cover the details of deleting these addresses and why it is being deleted. Thus the applicant has failed to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 1 recites the limitation "storing the computed function on at least one spare disk". There is insufficient antecedent basis for this limitation in the claim.

Proper clarification is needed as to what is being stored.

Claims 1-10 are rejected for inheriting the deficiencies of each of their respective base claims.

With respect to claim 11, it is not clear from the specification as to certain terms and phrases in the claim which are not explained in the specification. The claim recites "monitoring said disks in said disk array for disk failures to occur" in line 2. There is no reference to "said disks" mentioned above in line 2 of the claim. The claim further recites "determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored". It is unclear as to what is meant by "altered since an immediate previous time said redundant data was stored". The claim further recites "recomputing altered portions of said redundant data; and storing the recomputed altered portions in said data blocks". The specification

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fails to explain this concept. Thus the applicant has failed to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 11 recites the limitation "monitoring said disks in said disk array for disk failures to occur" in line 2. There is insufficient antecedent basis for this limitation in the claim.

There is no reference to "said disks" mentioned above line 2 in the claim.

Claims 12-18 are rejected for inheriting the deficiencies of each of their respective base claims.

With respect to claim 19, it is not clear from the specification as to certain terms and phrases in the claim which are not explained in the specification. The claim states "a monitor operable for monitoring the disks in the array for disk failures to occur" in line 3. There is no reference to disks above line 3 of the claim. The claim recites "a directory operable for determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored". It is unclear as to what is meant by "altered since an immediate previous time said redundant data was stored". Thus the applicant has failed to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 19 recites the limitation " a monitor operable for monitoring the disks in the array for disk failures to occur" in line 3. There is insufficient antecedent basis for this limitation in the claim.

There is no reference to disks mentioned above line 3 in the claim.

Claims 20-26 are rejected for inheriting the deficiencies of each of their respective base claims.

With respect to claim 27, it is not clear from the specification as to certain terms and phrases in the claim which are not explained in the specification. The claim states "means for monitoring said disk for disk failures to occur in line 2. The term "said disk" is not referenced above line 2 in the claim. The claim recites "a means for determining which of said data blocks contain redundant data that has been altered since an immediate previous time said redundant data was stored". It is unclear as to what is meant by " altered since an immediate previous time said redundant data was stored". Another ambiguity is whether either all of the redundant data is being altered or none of the redundant data being altered. The claim further recites a "means for storing the recomputed altered portions in said data blocks". There is no reference made in the specification to identify "means for storing recomputed altered portions in said data blocks". Thus the applicant has failed to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 27 recites the limitation "means for monitoring said disk for disk failures to occur" in line 2. There is insufficient antecedent basis for this limitation in the claim.

There is no reference to said disk mentioned above line 2.

Due to ambiguities in claims 1, 11, 19 and 27 these issues introduce a great deal of confusion and uncertainty as to the proper interpretation of the limitations of the claim hence art will not be applied pursuant to MPEP Section 2173.06 (In re Steele, 305 F.2d 859, 134 USPQ 292 (CCPA 1962)) and (In re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Enam Ahmed whose telephone number is 571-270-01729. The examiner can normally be reached on Mon-Fri from 8:30 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Robertson, can be reached on 571-272-4186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Requirement for information under 37 C.F.R. § 1.105

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

A Prior art search by the examiner was conducted and has failed to reveal a clear understanding as to the background of the invention as is reasonably necessary to the examination of this application.

In response to this requirement, please provide a copy of each of the following items of art referred to in the appendix:

[0036] [1] P.M. Chen et al, "RAID: High-Performance, Reliable Secondary Storage," ACM Computing Surveys, 26, 2, pp. 145-185, June 1994.

[0037] [2] J. Menon et al., "A Comparision of Sparing Alternatives For Disk Arrays,' Proceedings of the 19th Annual International Symposium on Computer Architecture, pp. 318-329, 1992.

[0038] [3] W.W. Hsu et al., "Characteristics of I/O Traffic in Personal Computer and Server Workloads," IBM Systems Journal, 42, 2, 2003.

[0039] [4] M. Blaum et al, "The EVENODD code and its generalization: An Efficient Scheme for Tolerating Multiple Disk Failures in RAID Architectures," High Performance Mass Storage and Parallel I/O: Technologies and applications, Ch. 14, pp. 187-208, 2001.

[0040] [5] L. Xu et al., "X-Code: MDS Array Codes with Optimal Encoding," IEEE Transactions on Information Theory, 45, 1, pp. 272-276, 1999.

[0041] [6] G.F. Hughes et al., "Improved Disk-Drive Failure Warnings," IEEE Transactions on Reliability, Vol. 51, No. 3, Sep 2002.

In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.

The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this

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requirement and any information disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

EA

EA

3/22/07

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